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A VISIT TO THE SHELL ISLANDS OF FLORIDA, by A. H. Curtiss.—Paper I.—On the eastern coast of Florida there are extensive grassy marshes stretching from the Everglades northward, with more or less interruption, to Georgia. These are separated from the ocean by islands and by long sand bars connecting with the mainland. The St. John's river is bordered with these marshes for several miles from its mouth. Through them and between the sea-islands and main land of Georgia travelers reach Florida by the "inland passage." This passage enters the river within sight of its mouth and between a group of islands called "The Sisters." These islands, like many others of smaller size which are scattered through the marshes, are composed entirely of oyster shells. Though the same species of mollusk now abounds in these waters, it is difficult to imagine what agency led to their accumulation into such vast mounds, rising abruptly from the marshes to a height of from five to twenty feet and sometimes covering a square mile in area. The Sisters are three in number, about equidistant, similar in size and readily suggest the name they bear. The appearance of these islands, their large size and apparent inaccessibility, the luxuriant vegetation covering a seemingly impenetrable soil, naturally excite the curiosity of passing tourists but it is evident that their botanical features were unknown previous to 1878, during which year the writer made frequent visits to them, and found them to be as marked in botanical as in geological features and as regards entomology, incomparable. It is a unique region, a land flowing with honey and gall, in which one may enjoy much and suffer much. With this, a foretaste, we invite the reader to accompany us mentally (the more comfortable way) on a tour of inspection.

Sailing down the lake-like St. John's till we emerge from the treacherous waters of the "middle marsh" we behold on our right the bold promontory called St. John's Bluff, rich in historical associations and in growths of *Ceratiola* and *Ximenia*, vast marshes to the left, and far ahead the dim shaggy outlines of the Sisters. A favoring breeze speeds us toward them; one by one the intervening miles are counted out, and presently we are skirting the outlying marshes of the largest, called Pine-Island. The banks in places are firm and brist-

ling with oysters, in others broken down and submerged by recent storms. Creeks cut them at intervals, leading, no one knows where. One inlet in particular, our boatman calls the "Mouth of Hanamile," which leads to the "Pepper Islands." Through the Mouth and down the throat of the passage we go, and soon reach the retreat of the fiery *Capsicum*. The banks are steep and composed wholly of bleached oyster shells which slip under our feet and throw us against the points of the "Spanish Bayonet," *Yucca aloifolia*, which almost entirely covers the island. Bleeding from its punctures we scale the parapet and look around. Bayonets bristle and interlock on every hand. There are shrubby growths of *Sageretia*, *Forestiera porulosa* and *Quercus virens*, with rigid spine-like branches and bloated Opuntias warning us to touch not. Climbing over these formidable plants and binding them together, is found that singular vine, the *Vincetoxicum scoparium*, Gray. Its tough, twine-like, green and almost leafless stems intertwine among neighboring plants like a *Cuscuta*. A dozen or more of these stems often twist together into a rope, run over to another branch or bush and separate again. If one cuts his way through the tangle each severed end reminds him that he is dealing with a member of the milk-weed family. It bears a profusion of minute yellowish flowers and the pods are as slender as the branches. The sister species, *V. palustre*, Gray, grows in saline marshes, twining in long spirals up the terete leaves of *Juncus* and *Fimbristylis*. The slender, half-shrubby *Capsicum frutescens* grows here in abundance, finding support for its straggling branches among shrubs of stouter growth. It closely resembles the southern, shrubby growth of *Solanum nigrum* except in fruit, which is red and apparently the same as the "Bird-pepper" sold by druggists. The fruit ripens throughout the year and birds gather it. The *Forestiera*, like its cousin *Chionanthes*, is a slender tree with similar fruit but inconspicuous flowers and meager foliage. Perceiving a clump of these trees laden at the top with ripe fruit we decide to climb for it, although the heat is intense. After much cutting of tangled vines and Bayonet points we reach the sought for fruit and find that the heat has so blistered it that the blue pulp has almost entirely disappeared, leaving the stones clean and yet firmly attached to their peduncles.

Leaving this inhospitable isle, a short sail brings us to 'Possum Island. Like the one just visited it is composed entirely of shells, but the vegetation is quite different. The characteristic plants of this are not boldly repellant as in the other, but of a deceptive, treacherous nature, armed with worse but partially concealed weap-

ons. I doubt if such an assemblage of execrable plants is to be found in so small a space elsewhere in the whole world. Hidden among the grass is the *Opuntia Pes-Corvi*, its slender, creeping joints armed with long, sharp spines, which inflict a most painful wound, the barbed points holding on so tenaciously that the joints of the cactus break off with them. It is a plant not to be handled with impunity—much less to be sat upon. Of the large *Opuntia vulgaris* there is also an abundance. It is armed with fascicles of minute, stinging spines which seem to have a much stronger attachment for ones hand than for the parent plant. Here are also barricades of Spanish Bayonets, tangles of spring vines, beds of Spanish needles and stinging nettles. But worst of all is the *Mentzelia Floridana* or “Poor Man’s Plaster.” It is as handsome as a primrose and as incapable of giving pain, yet one soon comes to dread it more than the *Yucca* or *Opuntia*. It is a weak, diffusely branching plant, reclining on the ground and on other plants, and adorned with bright yellow flowers similar to those of a cactus. Its leaves are extremely pretty and change as they fade to various shades of yellow and brown. A weary, unwary tourist is tempted to recline upon the soft mats of herbage it spreads so invitingly, but woe to him if he yields to the temptation, for upon rising he finds himself clothed like Joseph in a coat of many colors, gorgeous with patches of yellow, orange, russet and every shade of green. Each leaf that touches him has stuck like an adhesive plaster and is not to be removed by pulling or scraping. The whole plant is covered with a pubescence consisting of minute, white, barbed, siliceous hairs, and as the leaves are very tender it is almost impossible to detach them from a woven fabric.

The resources of this islet are soon exhausted, and the excessive heat constrains us to betake ourselves to the water again. There is no shade and the shells seem to give out as much heat as the sun itself, producing a temperature of fully 150 degrees. Once again floating between walls of living green, thoughts of sunstroke are supplanted by anticipations of rest and pleasure within the inviting groves of Pine-Island to which we now draw near. Our journey has been thus far a purgatorial passage to—perhaps—a botanical paradise. We shall soon know if our boatman finds the right channel through the marshes and that before the tide ebbs. (To be continued.)

CARBONIC ACID IN THE AIR OF FORESTS.—The information has come to us that Prof. Ebermayer and Dr. Schwappach find that the air

within an extensive forest contains, in summer almost double the proportion of carbonic acid in the air over the open country. On the other hand, forest soil is in summer very much poorer in carbonic acid than the soil of the open fields and the amount in the latter rises with elevation of temperature much more rapidly than does that in the former. The diffusion of carbon in the soil seems to be slow, as its quantity appears to vary greatly in places close to each other.

THE PHYLLOTAXIS OF LEAVES, by A. P. Morgan, M. D.—1. The arrangement of leaves upon the stem is denominated *phyllotaxis*. Leaves are arranged upon the stem in three principal ways; (1) they are *alternate*, (2) they are *opposite*, (3) they are *verticillate* or *whorled*. Leaves are alternate upon the stem when but a single leaf grows at each node. Leaves are opposite when two leaves grow at each node upon opposite sides of the stem. The leaves are verticillate or whorled when more than two leaves grow in a circle or whorl around each node of the stem.

I. *Alternate Leaves*.—2. Alternate leaves are arranged upon the stem in a succession of spiral *cycles*. The length of each cycle is determined by the distance from any one leaf to the leaf directly above it upon the stem. The cycle is represented by a fraction of which the numerator denotes the number of times the spiral winds around the stem, and the denominator indicates the number of leaves in the cycle.

3. The various arrangements of alternate leaves are designated in accordance with the numbers of their vertical ranks upon the stem; these are always the same as the number of leaves in the cycles.

4. It has been ascertained that with rare exceptions the cycles in the various arrangements of alternate leaves are represented by the series of fractions;

1-2, 1 3, 2-5, 3-8, 5-13, 8-21, 13-34, &c.

It is here proposed to amend this series by placing at its beginning 0-1. In this series the numerator of each fraction after the first two is obtained by adding the numerators of the two preceding fractions, and the denominator is obtained by adding their denominators.

5. The series 0-1, 1-2, 1 3, 2-5, &c, represents the different cycles of arrangement when we follow the shortest path around the stem. If we go around in the opposite direction, by the longest route, the series will be, 1-1, 1-2, 2-3, 3-5, 5-8, 8-13, 13-21, 21-34, &c., in which each fraction is the complement of the corresponding fraction in the preceding series.